# ATOMIC ENERGY

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Dear Sir:

A contract has now been awarded Pratt & Whitney aircraft division, United Aircraft Corp., East Hartford, Conn., to work on the development of a nuclear aircraft propulsion plant. The contract, awarded by the Air Force, is being financed out of the Air Force's research and development funds. This is a wholly separate project from the contract awarded earlier this year to General Electric to develop an aircraft nuclear power plant for an airframe to be built by Consolidated Vultee Aircraft Corp. Air Force officials said in Washington last week that the projected Pratt & Whitney engine was intended for another aircraft, and stated that the two projects were not competitive, but merely two different technical paths to the same end.

Operations have now been started at Oak Ridge on the K-31 gaseous diffusion plant producing uranium-235. Operated by Carbide and Carbon Chemical Div., the new $165 million plant will add substantially to the output of uranium-235. Construction had begun on K-31 on December, 1949. The new unit represents the 4th gaseous diffusion plant to be completed at Oak Ridge, at an estimated combined cost of $880 million.

One of the first plants to recover uranium from phosphates will be the new production unit for the manufacture of concentrated superphosphate by the wet acid process to be erected by Virginia-Carolina Chemical Corp., on property near Nicholas, Fla. The unit will be composed of an advanced type of contact sulfuric acid plant, a wet process phosphoric acid plant with provision for urarium extraction, and a complete triple superphosphate unit, including granulation equipment.

The Atomic Energy Labor Relations Panel, in its recent semi-annual report to the President stated it has observed evidence "of an awareness, on the part of both managements and unions involved in the atomic energy building program, of the serious consequences of work interruptions". The Panel noted that since the start of the Korean war the construction of new facilities has greatly increased. From June 1st to December first (1951) the panel closed its files on nine cases. Two are still open. Of the eleven cases handled, five involved construction projects.

A projected European nuclear physics laboratory is now under discussion by physicists of twelve European countries who have been meeting during the last fortnight in Paris at the headquarters of UNESCO there. The belief is general that no single European country, with its own limited resources, could create facilities to equal those of the United States, in the field of nuclear physics. Prof. Francis Perrin, French Atomic Energy Commissioner, stated that "we must rapidly give the young scientists a means of work or give them assurance that it will be supplied in the near future on a scale comparable to that in the United States". Sir George Thomson of Great Britain stated that "many young men are leaving Europe because there are not adequate facilities for research". Present plans include a 400 Mev synchrocyclotron, now being constructed at the University of Liverpool; two larger accelerators, one of 500 Mev and another of 5 Bev; and a European laboratory, to cost several millions of dollars, to house the apparatus.

Special digest of selected papers presented at the annual meeting, American Association for the Advancement of Science, Philadelphia, Dec. 26-31st, 1951.

Radioisotopes for Industrial Research and Application-(As presented by P. C. Aebersold, USAEC Oak Ridge, Tenn.) In their best known and most widely used role, radioisotopes are employed as tracer atoms. In this role they are a particularly valuable analytical tool because of their unprecedented sensitivity, specificity, and versatility. Radioisotopes have also attracted wide attention, especially in industry, as uniquely applicable sources of ionizing radiation. As tracers, radioisotopes have already been used by industry to study physical phenomena such as friction wear and solid diffusion; physical-chemical phenomena such as detergency, mineral flotation, and movement of preservative; and chemical phenomena such as the mechanism and kinetics of chemical reactions. They have been used to study the role of catalysts, in Fischer-Tropsch synthesis, and as source of coke sulfur. As sources of radiation, industry has found use for radioisotopes in radiography, and in various types of quality control instrumentation such as thickness and liquid level gauges, and density meters. Quite recently, considerable interest has been expressed in the possible industrial use of large quantities of fission product radioisotopes. Potentially, there are a number of large scale applications of these fission products, including the activation of phosphors, the manufacture of static eliminators, and the cold sterilization of foods and drugs.

Ionizing Radiation from Radium and Polonium for Optical Lens Applications-(As presented by Sigmund Berk, Pitman-Dunn Laboratories Dep't., Frankford Arsenal, Phila.) The fungus fouling of optical glass in binoculars and other optical instruments used and stored in tropical areas during World War II was of great concern to the Ordnance Corps. One of the preventive measures suggested was the use of radioactive materials in proximity to optical elements. A study was, therefore, undertaken to determine the effectiveness of the radiations from radium and polonium in combatting fungus growth. It was found that the alpha particles from radium and polonium were primarily responsible for the biological effects observed. Continuous irradiation with a radium and polonium source inhibited the growth and reproduction of a number of fungi.

Present and Future Problems of Radioisotope Manufacture-(As presented by J. A. Cox, Superintendent, Pile Operations Dep't., Oak Ridge National Laboratory) Major problems in radioisotope manufacture are: Obtaining high specific activity (radioactivity per unit weight of element), production of sufficient quantities to meet the demand for medical, scientific, and industrial uses, and elimination of contaminating radioisotopes. The first two problems are generally dependent upon the neutron flux used. When a reactor having a high neutron flux becomes available, specific activities sufficient to meet many therapuetic and scientific demands can be produced. Most demands can be fulfilled quantity-wise at present, but growing demands may soon exceed present production facilities. The purity requirements for target material will probably neccessitate the preparation of purified chemicals much purer than those generally available today.

Problems in the Manufacture of Fission Product Teletherapy Sources-(As presented by A. F. Rupp, Superintendent, Radioisotope Development Department, Oak Ridge National Laboratory). It has been recognized for a number of years that the fission products separated and regarded as waste in plutonium processing plants are a great potential source of relatively cheap radiation. In addition to possible industrial uses, the employment of certain of these fission products in teletherapy units appears promising. Considering that fission product source material for teletherapy work must emit gamma radiation, have a half-life longer than 150 days, and occur in high fission yield, the list of possible fission products is reduced to only two: Cesium-137, which has a 33-year half-life, and cerium-144 which has a 275-day half-life. Experience in producing 100-curie batches of fission products indicates that it is possible to extend existing methods to the kilocurie scale required for teletherapy units. Problems encountered at such high radiation levels include increased complexity of remote control processing apparatus required, the effects of intense radiation on materials, and the need for fool-proof operational techniques. However, we look forward to the availability of kilocurie sources of fission products within the next five years.

Problems of the Atomic Age; A special digest of remarks by Gordon Dean, Chairman, USAEC, at Duke University, N.C., Dec. 11, 1951

Too many people today seem to be living in an unreal world, marked by deep gloom, frenetic but undirected activity, or a fatalistic resignation to the coming of an atomic holocaust.

It is my feeling that in large part the despair and hopelessness with which many people view the world today stems from the fact that we have such a thing as atomic energy. The numbing effect of the times is caused, at least in part, in my view, by the vision of atomic disaster born at Hiroshima and Nagasaki, and stimulated by the glimpses of weapons tests at Eniwetok, in Nevada, and in the Soviet Union.

This vision has had what I consider to be a curious and inexplicable effect. The reaction of most people to the subject of atomic energy is one of rejection--of an unwillingness to think about it or to attempt to understand it. There apparently is a mental block in most people's minds behind which the elementary facts of this new force cannot penetrate, no matter how simply or how appealing they can be made. There is not only very little understanding--there is very little will to understand. I do not know of any other time in history when people have reacted in this way on such a mass basis to a new scientific discovery or to a new weapon. It was not true of electricity, or of gasoline, or of dynamite or poison gas or the machine gun. And yet it is apparently true of atomic energy.

And in the absence of understanding, we find the breeding ground of panic, apathy, and a fatalistic resignation to catastrophe.

I have heard it said that nuclear radiation is mysterious. As far as its effects are concerned, it is not. We know what it does; we know how to detect it; we know how to protect ourselves against it; and we are learning what to do to treat its effects. In the atomic energy program we have learned to live with radiation--we work with it every day--and there is no reason why the public in general cannot learn to live with it if people will only try to understand its effects.

Of course atomic energy is a science, and no one but a scientist can hope to understand many of the principles involved.

But you don't have to be a scientist to understand and ponder the differences between the American and Russian proposals for the international control of atomic energy, or to find out enough to decide for yourself whether private enterprise or the government should control the atomic energy program of the United States. And you don't have to be a scientist to make up your own mind about what the peaceful uses of atomic energy can mean, and whether or not the search for these peaceful uses should be pushed more or less vigorously at this point in the history of the world.

If we look at atomic energy coolly and analytically, we no longer see a fearsome, uncontrollable force. We see instead what it really is--a new and potentially highly useful source of energy. In its practical aspects, it means:

1. - Radioisotopes for better health, increased food supplies, new industrial products, and continued scientific advancement.

2. - Power to drive ships and aircraft, to light cities, and do mans' bidding.

3. - Weapons for the defense of the United States, and the free world.

Of these, we can understand from information available what radioisotopes are, what they will do, and how they can be put to work for mankind. We can understand the basic principles of atomic power, and its advantages and limitations. And we can understand the effects of atomic weapons, and the basic principles which make their manufacture possible.

If we can educate ourselves to understand these things, we will have stripped the atom of most of its fearsomeness, and we will have gone a long way toward increasing our ability to take a reasonable and responsible position in regard to the many problems which face us in atomic energy. We will know where we stand on the issue of government ownership versus private participation--the issue of secrecy versus non-secrecy--and the question of military versus civilian control. And we will know more about the various plans for international control which have been debated at such great length in the United Nations. The importance of this cannot be overstressed--for there is probably no single issue in the world today with a potentially greater effect upon the lives of all of us than atomic energy.

RAW MATERIALS...radioactive minerals for nuclear work...

CANADA- A review of the uranium exploration activities, during 1951, in Canada, shows numerous companies active in this field.

In British Columbia, interest in uranium was centered mainly in the Hazelton district, and at Birch Island, about 80 miles north of Kamloops. In the past few years, uranium has been found at seven properties near Hazelton, most of which are former producers of gold, silver, etc., uranium being of secondary interest. Several of these properties have been acquired by Western Uranium Cobalt Mines, and uranium may be recovered as a by-product. The work near Birch Island was at the former Smuggler property which has been acquired by Rexspar Uranium and Metals Mining Company. In 1948, samples of fluorite and celestite, which occur here, were found to be radioactive. Most recently, work has been done to test the possibility of producing uranium alone, or along with fluorite.

Principal activity for uranium in the Northwest Territories was at the government-owned Eldorado mine at Great Bear Lake. Under an agreement with Ventures Claims, Ltd., Eldorado continued exploration of a block of three claims held by Ventures adjoining the Eldorado property. Other work in the Great Bear Lake region included raising and diamond drilling at the Contact Lake mine of Acadia Uranium Mines, done from January to April, 1951. During the Summer, surface work was done at the El Bonanza silver property, where pitchblende has been reported to occur as well. The main work in the Hottah Lake region was at the Pitch 8 to 10 Group, held by Indore Gold Mines, where pitchblende occurring in zones along the walls of a diabase dike was explored by drifting from an adit. In the Marian River region, diamond drilling was done at the Ted Group of Yellowknife Volcanic Gold Mines Limited. At the East Arm of Great Slave Lake, where considerable activity took place in 1950, prospecting and assessment work were done, but the region did not receive the attention it did in the previous year.

In Saskatchewan: The Goldfields region north of Lake Athabaska is at present the most active uranium area, and several million dollars have been spent there during the year on exploration, development, transportation facilities, and housing. At Eldorado's Ace mine, it has been responsibly predicted that the production will at least equal, and probably exceed, Eldorado's Great Bear Lake property. Exploration of privately-owned properties in the Goldfields region was stimulated by the announcement that Eldorado would buy and treat custom ore from properties within easy access of its proposed mill. Numerous pitchblende occurrences have been found on privately-owned properties in the region. Of these properties that have received underground exploration, the largest amount of work has been done at the Nicholson. (Last week, officials of Radiore Uranium Mines, Ltd., and Eldorado, reached an agreement on a deal by which Eldorado is to take over on a royalty basis the 24-claim Radiore group, which adjoins on the south the main Eldorado holdings at Beaverlodge Lake, here in northern Saskatchewan. The deal provides that Eldorado will pay Radiore $50,000 upon signing the agreement, and that Eldorado will pay a royalty of 50¢ per pound for all uranium oxide that is contained in ore shipped from the Radiore property. The $50,000 is an advance royalty; all mining and milling expenses as well as metallurgical losses will be borne by Eldorado.) Companies in the Goldfields region that did diamond drilling during 1951, or which reported their intention to, were Amax Athabasca Uranium Mines, Ameranium Mines, Athona Mines, Baska Uranium Mines, Cinch Lake Uranium Mines, Clix Athabasca Uranium Mines, Orbit Uranium Developments, Rix Athabasca Uranium Mines, and Transcontinental Resources. Additionally, several other companies did surface work.

In the Black Lake-Charlebois Lake Region, about 140 miles east of Goldfields, Nisto Mines did underground work until June, 1951. Diamond drilling was done near Charlebois Lake by Consolidated Mining and Smelting Co. of Canada, Charlebois Lake Uranium Mines, and Dee Explorations.

In Ontario, uranium exploration was mainly in the Sault Ste. Marie and Wilberforce regions. Considerable work was done, principally at the LaBine-McCarthy property near the Montreal River. Others active here included Ranwick, Patrick Uranium Mines, and Cardiff Fluorite Mines.

In Quebec, several additional occurrences of radioactive minerals in pegmatites were reported from the southern part of the Canadian Shield. No exploration was reported as having been done here.

ATOMIC PATENT DIGEST...latest U. S. grants & applications...

A new group of U. S. government-owned patents, developed in the course of nuclear research, have now been made available on a royalty-free (non-exclusive) basis. Applicants for licenses should apply to the Patent Branch, USAEC, Washington 25, D.C. This group comprises: (1) High pressure polymerization of perhaloolefins; U. S. Pat. No. 2,567,956. (2) Process of producing uranium hexachloride; U. S. Pat. No. 2,572,156. (3) Mass spectrograph; U. S. Pat. No. 2,572,600. (4) Method and apparatus for measuring strong alpha emitters; U. S. Pat. No. 2,573,069. (5) Manufacture of porous articles from trifluorochloroethylene polymer; U. S. Pat. No. 2,573,639. (6) Gas analyzer; U. S. Pat. No. 2,573,649. (7) Manufacture of uranium tetrachloride; U. S. Pat. No. 2,574,268. (8) Process for the preparation of fluorocarbons; U. S. Pat. No. 2,574,619. (9) Uranium-cobalt alloys; U. S. Pat. No. 2,574,626. (10) Uranium-cobalt alloys; U. S. Pat. No. 2,574,627. (11) Radiation detection and measuring apparatus and methods; U. S. Pat. No. 2,574,632. (12) Alkyl ether of chlorofluoroheptene; U. S. Pat. No. 2,574,649. (13) Apparatus for focusing high-energy particles; U. S. Pat. No. 2,574,655. (14) Materials and methods for radiography; U. S. Pat. No. 2,574,681. (15) Timing apparatus; U. S. Pat. No. 2,574,841. (16) Methods and apparatus for purifying and packaging uranium hexachloride; U. S. Pat. No. 2,574,842. (17) Counter chronographs; U. S. Pat. No. 2,575,759. (18) Preparation of heavy metal borohydrides; U. S. Pat. No. 2,575,760. (19) Devices for generating neutrons; U. S. Pat. No. 2,576,600. (20) Methods of accelerating ions; U. S. Pat. No. 2,576,601. (21) Monitors for fission gases; U. S. Pat. No. 2,576,616. (22) Pulse shaping circuits; U. S. Pat. No. 2,576,661. (23) Pressure measuring device; U. S. Pat. No. 2,577,066. (24) Method for separation of americium from solutions containing the same; U. S. Pat. No. 2,577,097. (25) Method for removal of radioactive contaminants; U. S. Pat. No. 2,577,514. (26) Electric positioning proportional floating control; U. S. Pat. No. 2,577,696. (27) Pulse transformer; U. S. Pat. No. 2,577,707. (28) Electromagnetically operated counter; U. S. Pat. No. 2,579,231. (29) Vacuum seal for fluorine generation system; U. S. Pat. No. 2,579,234. (30) Rectifier system; U. S. Pat. No. 2,579,235.

ATOMIC ENERGY DEVELOPMENTS ABROAD...

Great Britain-A short summary of atomic energy progress in Britain was recently outlined in Parliament by Mr. Sandys, Minister of Supply. He stated that detailed studies were proceeding on individual technological problems which had to be solved before the construction of an experimental nuclear power reactor could be undertaken. The development of the supply of nuclear fuel, and of the chemical separation processes connected with its production, was proceeding satisfactorily. Facilities had been or were being established for the production of the rare earths which would probably be required. The first stages in the work on design studies of experimental reactors for marine propulsion were being concluded, and further work would probably be required. Studies were being made of other types of nuclear reactors. There was a steadily increasing demand, both at home and abroad, Mr. Sandys continued, for radioactive isotopes for use in industry, medicine, and science. Improved facilities for production and distribution, and for training in their use, were being made available. More than 800 consignments were now being delivered each month. He noted, however, that the use of atomic energy, for industrial power, or as a means of locomotion, was still in a very early stage.

India- In the course of an extended search for reagents for the separation of thorium from rare earth elements in monazite, D.S.N. Murty and B.S.V. Raghava Rao, Andhra University, Waltair, India, have shown that camphoric acid precipitates thorium quantitatively in an ammonium acetate buffer. The approximate pH has been determined as 4.2 and higher. Cerite earths are precipitated by the reagent at pH 6.2 and higher. Separation of thorium from the cerite earths has been achieved by a double precipitation at pH 4.4. The procedure has been utilized for the estimation of thorium in monazite extracts.

Sincerely,

The Staff,
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